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TAXONOMIC FERN NOTES, VI — NEW SPECIES OF
AMERICAN CYATHEACEAE.

ROLLA TRYON

The many ample collections of tree ferns made during explorations in South America by Julian Steyermark, Bassett Maguire, John Wurdack, Ramón Ferreyra, Benkt Sparre, and Paul Hutchison and Kenneth Wright are an essential source of information for studies of the American Cyatheaceae now in progress. Several of the new species among them are described here in addition to the species of tree fern that is characteristic of the mossy forest of Puerto Rico.

Some of the endemism in the Cyatheaceae in Guayana is reflected in the four new species from that region. Although endemism in the ferns in this area is not as strong as in many groups of flowering plants, it is significant especially with respect to the remarkable morphological innovations.

The species are described under the genera recognized in my recent paper on the classification of the family (Tryon, 1970) and special terms employed are defined there. The illustrations have been prepared by Sally Landry, Mary Robbins, and Lydia Wunsch.

Sphaeropteris sipapoensis Tryon, spec. nov. Figs. 1-4.

Petiolus sine spinis squamis multis persistentibus structura conformi circa 1-2 cm longis brunneolo-albis manifeste ciliatis; lamina bipinnata pinna apicali subconformi; rhachis

squamata; pinnae ad 40 cm longae petiolulatae; pinnulae integra vel aliquantum lobatae subcoriaceae articulatae breviter petiolulatae base late cordata apice subacuto vel acuminato pagina superiore glabra pagina inferiore squamis valde dissectis; venae liberae; sori submarginales plerumque a margine circa 0.5 mm exindusiati paraphysibus longioribus quam sporangiis albidis circa 1 mm longis. Holotypus: Mixed forest at Intermediate Camp, Cerro Sipapo (Paráque), Terr. Amazonas, Venezuela, 2 Feb. 1949, *B. Maguire and L. Politi* 28765, NY. Isotypus: GH.

Sphaeropteris sipapoensis is closely related to *S. marginalis* (Kl.) Tryon of British Guiana and Surinam. The two species share the following characters: large, brownish-white, long-ciliate petiole scales, stalked pinnules, a nearly conform terminal pinna at the lamina apex and the absence of an indusium. *Sphaeropteris marginalis* has the sori farther (mostly 1.2-2.0 mm) back from the margin than *S. sipapoensis* and the paraphyses are shorter (ca. 0.5 mm long) and tan to brown in color. *Sphaeropteris marginalis* also has smaller, less coriaceous, and more deeply lobed pinnules than *S. sipapoensis*. Further collections are required in order to assess the importance of these pinnule characters.

The related *S. marginalis* has been reported from Mexico (for example, by Maxon and Morton, p. 70, 1948) but this is based on an erroneous association of a specimen of the species at Kew ! with the label of *Jurgensen* 915, Sierra San Nolasco, Mexico. Fournier (p. 135, 1872) cites *Jurgensen* 915 as *Hemistegia decurrens* [= *Cnemidaria decurrens* (Liebm.) Tryon], a species of Mexico and undoubtedly the one properly associated with the label.

Sphaeropteris Atahuallpa Tryon, spec. nov. Figs. 5-8.

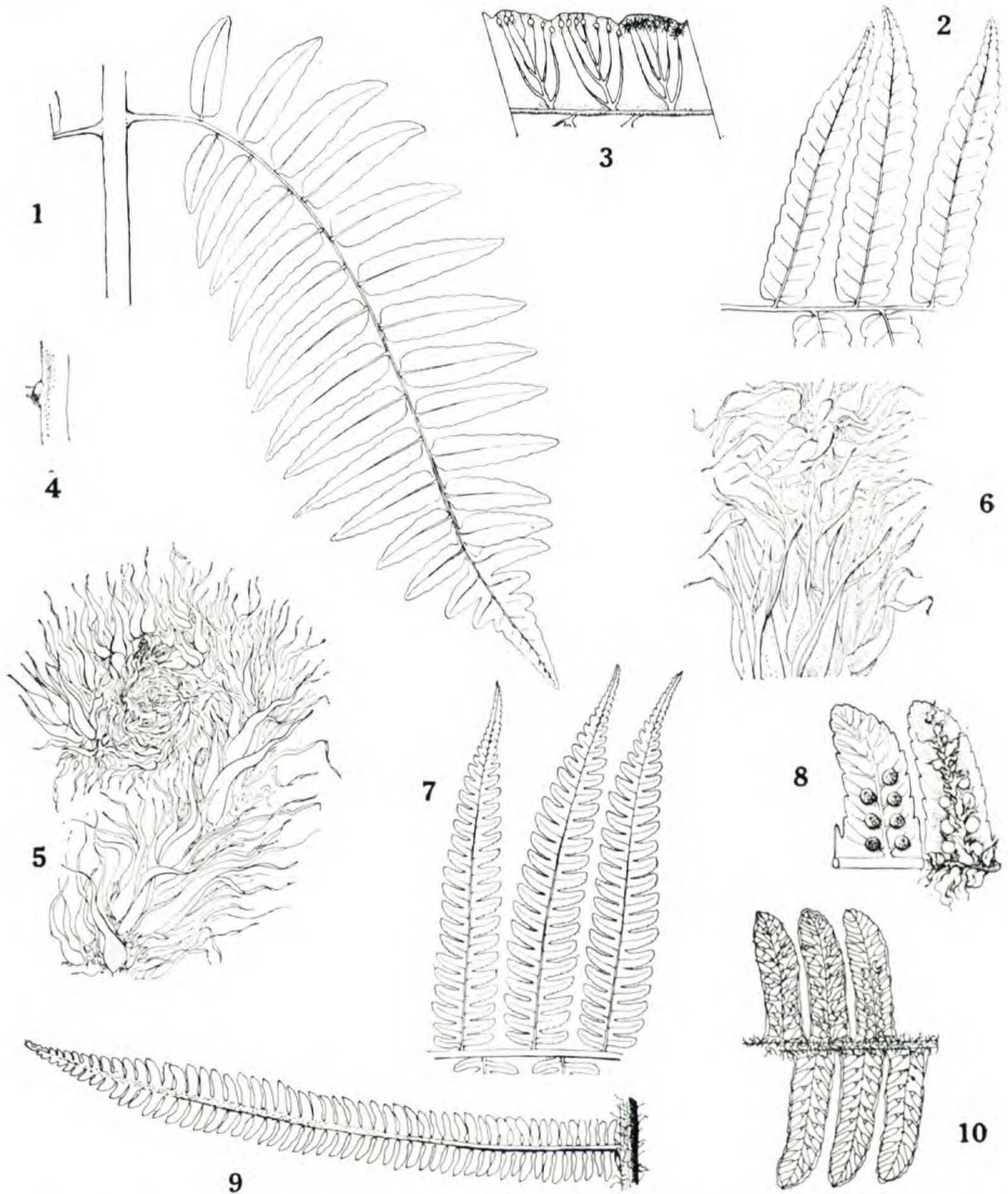
Petiolus parce tuberculatus squamis structura conformi ad 6 cm longis 1 cm latis brunneolo-albis basem versus densissimis persistentibus squamis minoribus longe ciliatis apice filiformi concolori squamellis multis valde dissectis etiam instructus; lamina bipinnato-pinnatifida vel juxta

rhachim bipinnato-pinnatisecta apice sensim acuminato; pinnae ad 70 cm longae subsessiles; pinnulae subsessiles segmentis minime crenato-serratis costulis inferne squamis albidis; venae liberae; sori ad furcam venarum; indusium subfuscum sphaeropteroideum. Holotypus: Cerros Calla Calla, above Balsas on road to Leimebamba, 3000-3100 m, Prov. Chachapoyas, Dept. Amazonas, Peru, 14 Oct. 1964, *P. C. Hutchison and J. W. Wright* 6922, GH. Paratypus: Summit of Puma-urcu, southeast of Chachapoyas, 3100-3200 m, Prov. Chachapoyas, Dept. of Amazonas, Peru, 3 July 1962, *J. J. Wurdack* 1153, GH.

Sphaeropteris Atahuallpa is a distinctive species, related by its sphaeropteroid (globose) indusium only to the species of the *Sphaeropteris horrida* group (Tryon, 1971). From these, however, it differs in the petiole scales which lack a dark apical seta and dark rigid marginal teeth. The largest petiole scales are five to six cells thick near their base. Atahuallpa, a son of Huayna Capac, was Lord-Inca of the Kingdom of Quito. He was captured at Cajamarca by Francisco Pizarro, then ransomed with silver and gold to the present value of perhaps fifty million dollars, and finally betrayed and murdered by Pizarro.

Alsophila bryophila Tryon, spec. nov. Figs. 9-10.

Petiolus brevissimus modice tuberculatus squamis structura marginata brunneis apice seta minima brunnea fragili; lamina pinnato-pinnatisecta vel juxta rhachim bipinnata basem versus modice vel sensim deminuta apice sensim acuminato; rhachis pubescens plus minusve squamata; pinnae ad 15-25 cm longae sessiles costa pagina superiore pubescenti pagina inferiore pubescenti saepe squamis subplanis sine setis fuscatis; segmenta integra coriacea utrinque longe pubescentia costulis basem versus squamis paucis albidis bullatis sine setis; venae liberae; sori ad furcam venarum; indusium hemitelioideum vel meniscoideum. Holotypus: Near West Peak, Luquillo National Forest, Puerto Rico, 12 Nov. 1966, *G. J. Gastony* 12, GH. Paratypi (all from Puerto Rico): *Howard, et al.* 15645, 15722,



Figs. 1-4. *Sphaeropteris sipapoensis*, (Maguire and Politi 28765). Fig. 1, basal pinna, $\times 1/3$, GH. Fig. 2, central pinnules of central pinna, $\times 1/3$, NY. Fig. 3, portion of fertile pinnule (paraphyses removed from receptacles to left), $\times 1$, NY. Fig. 4, articulate pinnule base, enlarged, NY.

Figs. 5-8. *Sphaeropteris Atahuallpa* (Hutchinson and Wright 6922, GH). Fig. 5, apical portion of crozier, $\times 1/3$. Fig. 6, portion of petiole, $\times 1/3$. Fig. 7, central pinnules of central pinna, $\times 1/3$. Fig. 8, fertile segments: sori and venation (left), with scaly indument (right), $\times 1\ 1/3$.

Figs. 9-10. *Alsophila bryophila* (Gastony 12, GH). Fig. 9, central pinna, $\times 1/3$. Fig. 10, fertile segments: indusia (upper right), with pubescence (upper to left), venation and receptacles (lower), $\times 1\ 1/3$.

15725, A; *Howard and Nevling* 15740, A; *Shafer* 3305, GH, MO; *Shafer* 3632, F, NY; *Sintenis* 1480, GH.

Alsophila bryophila grows in wet forests in Puerto Rico at elevations of about 900-1000 m. The species is characteristic of the mossy (elfin) forest of the Luquillo Mountains and the specific epithet is derived from this association.

Alsophila bryophila is close to *A. minor* (D. C. Eaton) Tryon, *A. hotteana* (C. Chr. and Ekman) Tryon and *A. Brooksii* (Maxon) Tryon, from which it can be distinguished by the hemitelioid to meniscoid indusium and the absence of dark setae on the scales of the under surface of the pinnae. The three related species all have a cup-shaped indusium and some, frequently many, scales or squamules on the under surface of the pinnae with dark setae on the margins and a dark seta at the apex. They also have the upper surface of the segments glabrous to rarely sparingly pubescent, which in *A. bryophila* the segments are usually strongly pubescent above. *Alsophila Brooksii*, also in Puerto Rico, is fully bipinnate through most of the lamina. Some materials of *A. hotteana* have a meniscoid indusium but in these specimens it is not certain that the structure is complete. They do have the distinguishing dark-armed indument on the axes beneath.

The other species of American *Alsophila*: *A. Abbottii* (Maxon) Tryon, *A. capensis* (L. f.) J. Sm., *A. confinis* (C. Chr.) Tryon, *A. dryopteroides* (Maxon) Tryon, *A. Engelii* Tryon, *A. Nockii* (Jenm.) Tryon, *A. paucifolia* Baker, *A. Salvinii* Hook. and *A. Urbanii* (Brause) Tryon, differ from *A. bryophila* in having a cup-shaped indusium and (or) in having a fully bipinnate or more complex lamina, and in different indument on the under surface of the pinnae.

Alsophila bryophila has long been known under the name of *Cyathea pubescens* Kuhn. That species, however, is *Nephelea pubescens* (Kuhn) Tryon and is endemic to the Blue Mountains of Jamaica (Gastony, 1972). *Cyathea*

pubescens has also been ascribed to Cuba and Hispaniola (Maxon, p. 386, 1926), but the specimens from those islands belong to *Alsophila minor*.

Trichipteris Steyermarkii Tryon, spec. nov. Figs. 11-12.

Petiolus basem versus acute tuberculatus squamis structura marginata; lamina bipinnata pinna apicali conformi; pinnae circa 25-35 cm longae articulatae breviter petiolulatae; pinnulae integrae vel subintegrae coriaceae articulatae breviter petiolulatae base cordata apice subacuto vel acuto pagina superiore glabra pagina inferiore squamis paucis brunneolis subplanis; venae liberae; sori ad furcam venarum exindusiati paraphysibus brevioribus quam sporangiis. Holotypus: Bosque nublado virgen en la cumbre, Cerro de Humo, Peninsula de Paria, Estado Sucre, Venezuela, 2 Mar. 1966, *J. A. Steyermark* 94923, VEN. Isotypi: GH, U. Paratypus: Selva nublada en la cumbre plana, Cerro Patao, Peninsula de Paria, Estado Sucre, Venezuela, 19 Jul. 1962, *J. A. Steyermark and G. Agostini* 91048, VEN.

Trichipteris Steyermarkii is related in its lamina architecture and articulate pinnae and pinnules to *T. sagittifolia* of Trinidad and to *T. cordata* of the states of Aragua and Carabobo, Venezuela. Both species differ from *T. Steyermarkii* in having bullate scales on the lower surface of the pinnules (*T. sagittifolia* also has some flattish ones). Further differences are the many long slender spines at the base of the petiole of *T. sagittifolia* and the pinnately lobed pinnules of *T. cordata*.

Hooker (p. 37, 1865) questioned the source of the Cruger collection upon which *Alsophila sagittifolia* was based: "Trinidad ? (possibly the opposite coast of Venezuela)". The type collection (Kew !) has bullate scales on the pinnules and corresponds with the Trinidad species (for example, *Fendler* 142 and 143).

Trichipteris Cyclodium Tryon, spec. nov. Figs. 13-14.

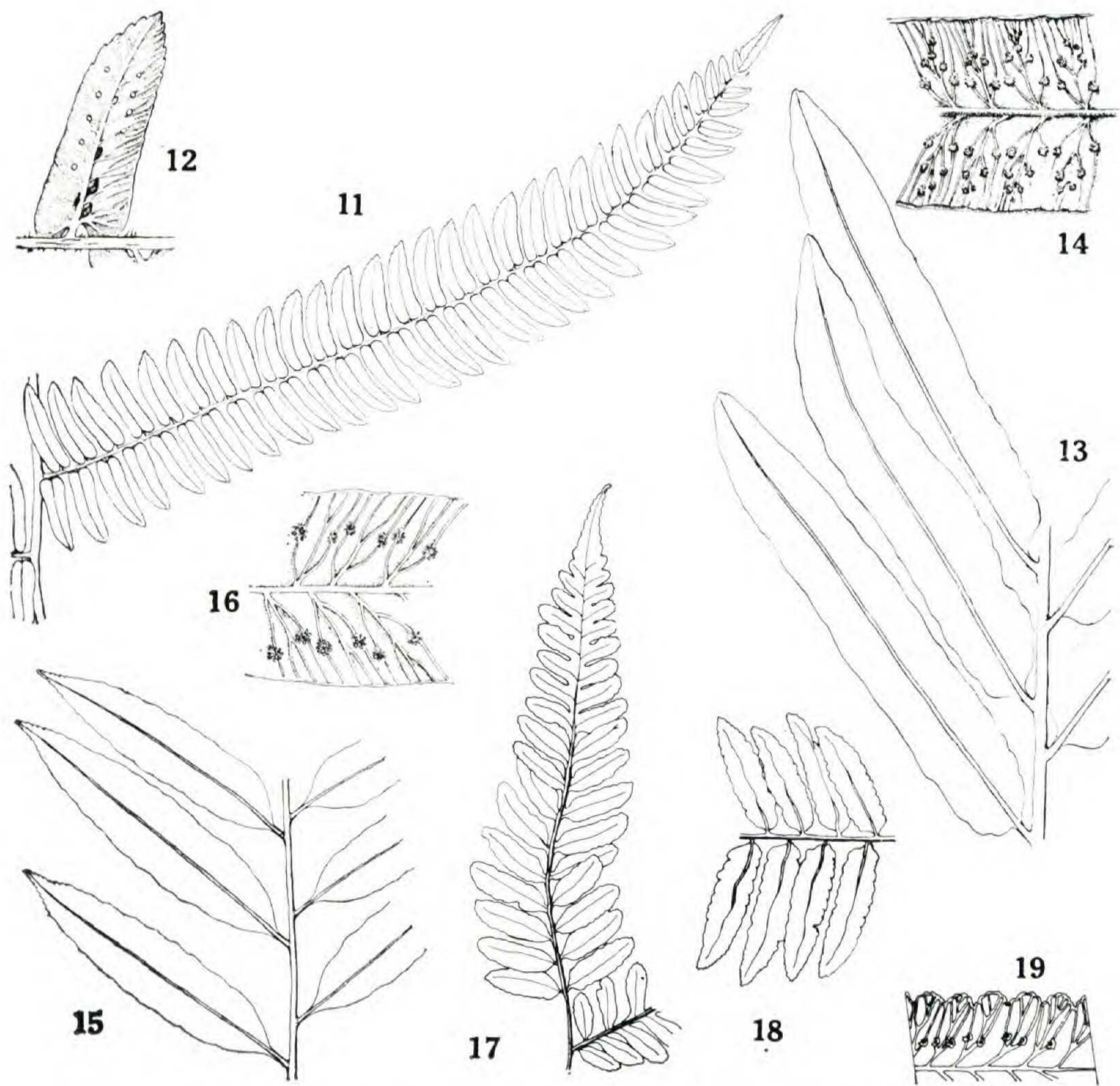
Petiolus sine spinis squamis structura marginata brunneis albido-limbatis dense ciliatis; lamina 1-pinnata pinna

apicali conformi articulata; pinnae circa 15-18 cm longae valde ascendentes integrae late crenatae vel minime pinatilobatae valde coriaceae articulatae petiolulatae utrinque glabrae vel subglabrae base late cuneata apice obtuso; venae liberae utrinque elevatae; sori plerumque in venis simplicibus 3-4 seriati exindusiati paraphysibus longioribus quam sporangiis. Holotypus: Camp Savanna, Cerro Sipapo (Paráque), Terr. Amazonas, Venezuela, 6 Dec. 1948, *B. Maguire and L. Politi* 27541, NY. Isotypus: GH.

Trichipteris Cyclodium is a very distinctive species. The lamina has a close resemblance to that of *Cyclodium meniscioides* (Willd.) Presl (a species that can also be placed in *Stigmatopteris* or *Dryopteris*, depending upon how generic lines are drawn). *Trichipteris Cyclodium* is related to *T. Williamsii* (Maxon) Tryon of Panama and to the next species *T. Maguirei* by its simple, articulate and stalked pinnae and by its lamina with a conform terminal pinna. It differs from *T. Williamsii* in its very coriaceous, strongly ascending, obtuse pinnae and whitish-bordered petiole scales. *Trichipteris Williamsii* has the pinnae only moderately thickened, patent and long-acuminate and the petiole scales are entirely whitish or have a brown stripe toward the apex. A comparison with *T. Maguirei* is made under that species.

***Trichipteris Maguirei* Tryon, spec. nov.** Figs. 15-16.

Petiolus sine spinis squamis structura marginata brunneis albido-limbatis dense ciliatis; lamina 1-pinnata pinna apicali conformi articulata vel apice binato; pinnae circa 8-12 cm longae integrae coriaceae articulatae utrinque glabrae pinnis basilaribus circa 7 mm petiolulatis base cuneata apice abrupte acuminato serrato; venae liberae vel aliquot junctae utrinque elevatae; sori plerumque in venis simplicibus 1-2 seriati exindusiati paraphysibus longioribus quam sporangiis. Holotypus: Frequent, terrestrial, talus forest near first escarpment, Cerro Sipapo (Paráque), Terr. Amazonas, Venezuela, 11 Dec. 1948, *B. Maguire and L. Politi* 27597, NY. Isotypus: GH. Paratypi: (all from



Figs. 11-12. *Trichipteris Steyermarkii* (Steyermark 94923, VEN). Fig. 11, central pinna, $\times 1/3$. Fig. 12, fertile pinnule, with receptacles and scales, $\times 1$.

Figs. 13-14. *Trichipteris Cyclodium* (Maguire and Politi 27541, NY). Fig. 13, central pinnae, $\times 1/3$. Fig. 14, portion of fertile pinna, with sori, $\times 2/3$.

Figs. 15-16. *Trichipteris Maguirei* (Maguire and Politi 27597, GH). Fig. 15, central pinnae, $\times 1/3$. Fig. 16, portion of fertile pinna, with sori, $\times 1$.

Figs. 17-19. *Cyathea Steyermarkii* (Steyermark 105194, GH), Fig. 17, lamina apex, $\times 1/3$. Fig. 18, central pinnules of central pinna, $\times 1/3$. Fig. 19, portion of fertile pinnule, with receptacles, $\times 1$.

Terr. Amazonas, Venezuela) Terrestrial, uncommon, wet montane moss forest, Phelps Camp to North Savanna, 1400 m, Cerro Sipapo (Paráque), 17 Dec. 1948, *B. Maguire and L. Politi* 27752, NY; terrestrial, wet mixed montane forest, slope above Cano Grande, 1500 m, Cerro Sipapo (Paráque), 21 Jan. 1949, *B. Maguire and L. Politi* 28493, NY; dense woodland along right fork of Cano de Dios, 1900 m, Cerro Huachamacari, Río Cunucunuma, 13 Dec. 1950, *B. Maguire, R. S. Cowan and J. J. Wurdack* 30188, NY.

Trichipteris Maguirei differs from the preceding species, *T. Cyclodium*, in its smaller pinnae that are cuneate at the base and abruptly acute to acuminate at the apex, and in the lamina that often has a pair of terminal pinnae. The larger pinnae of *T. Cyclodium* are broadly cuneate at the base and obtuse at the apex, and the lamina has a single terminal pinna. *Trichipteris Maguirei* is perhaps more closely related to *T. Williamsii*, but differs from it in the smaller pinnae, ca. 8-12 cm. long, the shorter pinna stalks, those of the basal pinnae being ca. 7 mm long, and the petiole scales with whitish borders. In *T. Williamsii*, the pinnae are ca. 15-20 cm long, the stalks of the basal ones are ca. 13 mm long, and the petiole scales are entirely whitish or have a brown stripe toward the apex.

Cyathea Steyermarkii Tryon, spec. nov. Figs. 17-19.

Petiolus basem versus modice muricatus squamis structura marginata brunneis brunneolo-albis-limbatis; lamina bipinnata pinna apicali conformi articulata; pinnae circa 25-30 cm longae articulatae petiolulatae apice sensim acuminato; pinnulae non articulatae crenatae vel aliquantum pinnatilobatae chartaceae base cuneata apice obtuso vel subacuto; venae liberae; sori plerumque in venis simplicibus inter costam et marginem medii; indusium parvum hemitelioideum. Holotypus: Cumbre del Cerro Autana, 4° 52" N. lat. 67° 27" W. long., 1230-1270 m, Terr. Amazonas, Venezuela, 21-22 Sept. 1971, *J. A. Steyermark* 105194, GH.

Cyathea Steyermarkii is related to three other species with a hemitelioid indusium: *Hemitelia conformis* Tryon, *H. petiolata* Hook. and *H. Woronovii* Maxon and Morton. I placed the first two in *Cnemidaria* (Tryon, 1970); however, Robert Stolze, who is monographing the genus, informs me that these species and *H. Woronovii* are to be excluded and properly belong in *Cyathea*. *Hemitelia petiolata* is the only one of these hemitelioid species that has been placed in *Cyathea* (as *C. panamensis* Domin). The three species have the sori close to the margin, while in *C. Steyermarkii* the sori are about half way between the costa and the margin. *Hemitelia petiolata* and *H. Woronovii* have the apex of the lamina gradually reduced to the tip, while in *C. Steyermarkii* the apex is a conform terminal pinna. *Hemitelia conformis* is further distinguished by the pinnae that have a conform, articulate terminal pinnule. In *C. Steyermarkii* the pinnae are gradually reduced at the apex.

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GRAY HERBARIUM,
HARVARD UNIVERSITY,
CAMBRIDGE, MASS. 02138